DOES FAMILIARITY BREED TRUST? THE IMPLICATIONS OF REPEATED TIES FOR CONTRACTUAL CHOICE IN ALLIANCES

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Exploring the factors that explain the choice of governance structures in interfirm alliances, this study challenges the use of a singular emphasis on transaction costs. Such an approach erroneously treats each transaction as independent and ignores the role of interfirm trust that emerges from repeated alliances between the same partners. Comprehensive multiindustry data on alliances made between 1970 and 1989 support the importance of such trust. Although support emerged for the transaction cost claim that alliances that encompass shared research and development are likely to be equity based, there is also strong evidence that repeated alliances between two partners are less likely than other alliances to be organized using equity.

In the last two decades, a number of environmental shifts have led to new opportunities for interfirm cooperation—the globalization of markets, the convergence of and rapid shifts in technologies, the rise of Japan and Europe as technologically advanced economies, and regulatory changes within the United States. Perhaps the most significant manifestation of this rise in interorganizational cooperation has been the dramatic increase in interfirm strategic alliances. Such alliances encompass a variety of agreements whereby two or more firms agree to pool their resources to pursue specific market opportunities. These agreements include joint ventures, joint R&D agreements, technology exchange, direct investment, licensing, and a host of other arrangements. Many empirical studies have documented the dramatic growth of such alliances in numerous industrial sectors, the multitude of reasons why firms have entered into such partnerships, and the wide variety of contractual arrangements firms use to formalize their alliances (Contractor & Lorange, 1988; Harrigan, 1986, 1989; Hergert & Morris, 1988; Hladik, 1985).

Economists and management theorists have become concerned in recent years with the contractual, or governance, structures used in alliances and most have adopted a theoretical stance informed by transaction cost eco-

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nomics (cf. Hennart, 1988; Pisano, 1989; Pisano, Russo, & Teece, 1988). Transaction cost theorists argue that anticipated transaction costs determine the type of contract used in an alliance. Transaction costs, which typically arise out of concerns about opportunistic behavior on the part of one or more of a set of partners, include the costs of negotiating and writing contingent contracts, monitoring contractual performance, enforcing contractual promises, and addressing breaches of contractual promises (Joskow, 1985: 36).

Much of the prior empirical research on transaction cost economics has examined the choice companies make between vertical integration and arm’s-length market transactions, also called the make-or-buy decision (Balakrishnan & Wernerfelt, 1986; Masten, 1984; Monteverde & Teece, 1982; Walker & Weber, 1984). In these instances, treating each transaction as discrete is justifiable since the repeated making of ties between the same two partners is rare. However, two firms may enter multiple strategic alliances with each other over several years. Empirical studies on the governance of alliances have unfortunately continued in the transaction cost economics tradition, treating each alliance as independent and considering the activities it includes as singularly reflecting the transaction costs associated with it. The approach taken is thus static; it ignores the possibility of repeated alliances and the emergent processes resulting from prior interactions between partners that may alter their calculus when they are choosing contracts in alliances (Ring & Van de Ven, 1992; Zajac & Olsen, 1993).

By ignoring the fact that firms may enter multiple alliances with each other over time, empirical work informed by transaction cost economics precludes the possibility that an important economic and social context may alter the formal structure of those alliances and the transaction costs associated with them. This omission is significant because experience can engender trust among partners, and trust can limit the transaction costs associated with their future alliances (Granovetter, 1985, 1992; Marsden, 1981). Early theorizing within transaction cost economics highlighted such facets (Commons, 1970; Williamson, 1975), but subsequent researchers in this stream have not systematically examined them.

This article draws on both transaction cost economics and sociological theory to examine the factors that explain the choice of governance structure in individual alliances. The social context of alliances, viewed here as emerging over time, can only be observed by examining firms’ relationships over time. Thus, I tested predictions with comprehensive data on alliances formed between 1970 and 1989 in the biopharmaceutical, new materials, and automotive economic sectors by American, European, and Japanese firms. I defined an alliance as any independently initiated interfirm link that involves exchange, sharing, or co-development. This definition, which excludes one-time marketing promotions, transient distribution agreements, technology purchase agreements, and state-supported R&D programs such as SEMATECH, a semiconductor industry consortium, the Microelectronics Computer Corporation, and ESPIRIT, a European Community—supported
subsidy program, is consistent with many prior empirical approaches to the study of alliances (Harrigan, 1986; Hergert & Morris, 1988; Hladik, 1985; Parkhe, 1993).

**TRANSACTION COSTS AND THE GOVERNANCE OF ALLIANCES**

According to transaction cost economics, in a world without transaction costs all activities would be carried out as exchanges between units, and it is due to the failure of markets, or arenas of exchange, to allow for many exchanges without prohibitively high governance costs that organizations come to exist (Williamson, 1985, 1991). In other words, hierarchical organization is considered a response to market failure. Transaction cost economics is not only concerned with the emergence of organizations per se to manage transaction costs, but also with how the choice of organizational form may vary according to the specific types of exchange activities encompassed. Thus, a second-order question examined is, how can existing exchange relations be structured to economize on transaction costs? In this context, the application of transaction cost economics to the formation of alliances is most apparent. Since alliances blend elements of the two extremes of market and hierarchy, it follows that firms would enter such arrangements when the transaction costs associated with an exchange are intermediate and not high enough to justify vertical integration (Bradach & Eccles, 1989; Eccles, 1981; Williamson, 1985).

A similar logic can be applied to draw even finer distinctions about the type of contract used in those intermediate instances in which transaction cost considerations mandate alliances. The contract used for an alliance will be closer to either the market or the hierarchy extreme, depending on the magnitude of the transaction costs: the greater the transaction costs, the more hierarchical the contract (Pisano, 1989; Pisano et al., 1988). The possibility of opportunistic behavior by a partner generates the most salient transaction costs in the alliance context. Additional costs result from making alliance-specific investments and from any uncertainty associated with the partnership itself.

The specific governance structure of alliances is important for a number of reasons. First, a contract is an important mechanism by which firms protect themselves from a partner’s opportunism. Evidence suggests that firms entering alliances are potentially vulnerable to the opportunistic behavior of their partners (Business Week, 1986; Doz, Hamel, & Prahalad, 1989; Kogut, 1988, 1989; Reich & Mankin, 1986). In the face of the hazards associated with alliances, the contracts used reflect the risks the partners see (Ring & Van de Ven, 1992).

Second, a contractual agreement serves as a framework within which cooperation between partners proceeds. Although alliance partners may not follow their initial contract to the letter, it provides a set of normative guidelines: “The major importance of a legal contract is to provide a framework
... a framework highly adjustable, a framework which almost never accurately indicates real working relations, but which affords a rough indication around which such relations vary, an occasional guide in case of doubt, and a norm of ultimate appeal when the relations cease in fact to work” (Llewellyn, 1931: 736–737).

Third, the recent availability of an array of innovative contractual arrangements opens up the possibility of new interfirm cooperative agreements. The dramatic increase in the use of arm’s-length contracts, which don’t involve shared ownership, is particularly noteworthy in this respect.

**Equity and Nonequity Alliances**

Transaction cost economists have classified the governance structures of alliances in terms of their use of equity ownership (Pisano, 1989; Pisano et al., 1988). Equity alliances, as defined by transaction cost economists, take one of two forms (Pisano, 1989). They can either be organized as an equity joint venture, which involves the creation of a new and independent jointly owned entity, or they can come about when one of the partners takes a minority equity position in the other partner or partners. Transaction cost economists justify treating equity joint ventures and minority equity investments as a single category on the grounds that “a direct equity investment by one firm into another essentially creates an equity joint venture between one firm’s existing shareholders and the new corporate investor” (Pisano, 1989: 111). In both types, the effective shared equity stakes of the firms vary case by case. The important point is that beyond a certain threshold, the shared ownership structure effectively deters opportunistic behavior.

Equity-based ventures are considered hierarchical to the extent that they more closely replicate some of the features associated with organizational hierarchies than do other alliances. An example of an equity joint venture is CFM International (CFMI), whose partners are the French jet engine manufacturer Société Nationale d’Etude et de Constructions de Moteurs d’Aviation (SNECMA) and General Electric. This 50-50 venture, formed in 1971 to produce jet engines for small commercial aircraft, has been eminently successful. According to the original agreement, the partners were to share both ownership and work equally. As is typical of equity joint ventures, CFMI is an entity with its own headquarters, chief executive officer (CEO), board of directors, and staff, members of which come from both companies (Enright, 1992).

Nonequity arrangements in contrast, don’t involve the sharing or exchange of equity, nor do they usually entail the creation of a new organizational entity. In the absence of any shared ownership structure, nonequity alliances are more akin to arm’s-length market exchanges on the continuum of market to hierarchy. Organization members of the partner firms work together directly from their own organizational confines. Nonequity alliances include unidirectional agreements, such as licensing, second-
sourcing, and distribution agreements, and bidirectional agreements such as joint contracts and technology exchange agreements. Examples of such alliances are some of the partnerships Cadence Technologies, a leader in electronic design automation, has entered over the years with their leading customers, such as Harris, Toshiba, National Semiconductor, Ericksson, Intel, Phillips, IBM, Mitsubishi, Kawasaki Steel, and SGS-Thompson. Within such partnerships, the customers share Cadence’s development costs for new products that are especially useful for the former’s own purposes. They provide Cadence with financial resources and may maintain engineering staff at Cadence to assist in the ongoing development efforts. Equity is exchanged, and no new organizational entities are created to oversee the partnerships.

From a transaction cost economics standpoint, quasi-market ties like nonequity alliances are the default mode for organizing alliances, and the use of equity must be explained. The explanation offered is that firms use equity alliances when the transaction costs associated with an exchange are too high to justify a quasi-market, nonequity alliance. Researchers have identified two sets of governance properties through which equity alliances effectively alleviate transaction costs (Pisano et al., 1988). The first are the properties of a “mutual hostage” situation in which shared equity helps align the interests of all the partners. Not only are the partners required to make ex ante commitments to an equity alliance, but also, their concern for their investment reduces the possibility of their behaving opportunistically over the course of the alliance (Williamson, 1975). In the case of alliances that involve sharing or developing new technologies over which property rights are difficult to enforce, equity ownership also provides an effective means for allocating such resources. For instance, at CFMI, both partners benefit from the increasing value of their equity in the venture. Issues of the ownership of intellectual property developed in the venture are sidestepped as the property belongs to the venture itself.

The second set of properties are those of the administrative hierarchy that not only oversees the day-to-day functioning of an alliance, but also addresses contingencies as they arise. In equity joint ventures, a hierarchy of managers serves this function; in the case of direct equity investments, hierarchical supervision is created when the investing partners participate in the board of directors of the partner that received the investment. For instance, the top management team of the joint venture CFMI includes a CEO, a chief financial officer (CFO), and two vice presidents. Traditionally, the CEO and one vice president have come from SNECMA and the CFO and the other vice president from General Electric. The board of directors, which includes top managers from both partners, ratifies important decisions. This participation is the mechanism by which partners exercise their residual rights of control (Grossman & Hart, 1986).

The benefits of equity alliances must be weighed against their disadvantages. Equity alliances can not only take a long time to negotiate and organize, but can also involve very high exit costs. Furthermore, significant
administrative costs can be associated with the hierarchical supervision they encompass.

The same pros and cons must be assessed for nonequity alliances. They can be negotiated rapidly and require only limited investments from each partner. For instance, the partners at Cadence Technologies can withdraw their investments at short notice if necessary, and Cadence can put together such alliances with other partners relatively quickly. But partners are vulnerable to each other's opportunistic behavior, and one may find it difficult to persuade the other to make significant alliance-specific investments (Joskow, 1985). A further difficulty may arise in alliances formed to share or develop new technologies; here, significant disagreements on the allocation of property rights may arise. Even when there is agreement, it may be difficult to transfer tacit knowledge across loosely connected firms (Badaracco, 1990; Hennart, 1988). Furthermore, such agreements entail a fair amount of management effort, albeit of a different nature than that required in equity alliances.

Following prior research on the governance of alliances, I chose to focus on the dichotomy between equity and nonequity alliances. My central concern was to examine the factors that explain the use of equity in alliances. I looked at equity for numerous reasons. First, its use is a prominent feature that offers a means to distinguish most alliances. Most other classifications are not based on such a readily measured feature, so alliances cannot easily be placed on their proposed scales. Second, the use of equity is an important measure by which partners, especially first-time ones, address their concerns about malfeasance in alliances. My previous fieldwork at firms entering alliances corroborates this practice (Gulati, 1993). Third, prior research by transaction cost economists on these issues has focused on the use of equity, so looking at the dichotomy between equity and nonequity alliances allows the present findings to be compared to those of prior research.

R&D alliances. Firms enter alliances for a wide variety of reasons. A primary basis from which transaction cost economics has examined the costs associated with alliances has been the activities encompassed by the agreement, for instance, the presence of R&D. Prior research suggests that transactions involving the sharing, exchange, or co-development of knowledge can be somewhat problematic because of the peculiar character of knowledge as a commodity (Arrow, 1974). Many of these problems result from parties' inability to accurately assess the value of the commodity being shared.

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1 Tacit knowledge here refers to knowledge that cannot be made fully explicit and typically resides in patterns of relationships, norms, information flows, ways of making decisions, and other organizational factors.
2 Systematic empirical studies have examined some of the economic and technological factors underlying the formation of alliances (Mariti & Smiley, 1983). Some of the typical motivations examined include sharing uncertainty, sharing costs, access to complementary technologies, learning new tacit technologies, reducing innovation period, monitoring environmental changes, entering foreign markets, and expanding product range (Hagedoorn & Schakenraad, 1990).
exchanged as well as from concerns about opportunism resulting from poor monitoring possibilities in such exchanges (Balakrishnan & Koza, 1993). The difficulty of transferring R&D know-how across organizations compounds these problems (Badaracco, 1990; Hennart, 1988). In sum, alliances with an R&D component are likely to have higher transaction costs than those that don’t involve joint R&D.

Transaction cost theorists claim that alliances encompassing R&D will most likely be organized as equity-based partnerships because of the significant transaction cost burden. Shared equity can align the interests of partners and limit opportunistic behavior by focusing attention on their equity stake in the alliance. Furthermore, such alliances are usually accompanied by an independent administrative structure, which fosters information flow and provides for ongoing coordination.

In a study of the telecommunications industry, Pisano, Russo, and Teece (1988) explicitly tested the impact of transaction costs on the nature of alliances. They predicted that the greater the hazards associated with an alliance, the more likely it will be equity based, and their findings supported these predictions. Pisano (1989) observed similar results in the biotechnology sector. In both cases, high transaction costs were measured as the presence of an R&D component in the alliance. In a study of U.S.–Japanese alliances, Osborn and Baughn (1990) followed a similar reasoning and also showed that alliances encompassing joint R&D were more likely to be equity based. Thus,

**Hypothesis 1:** Alliances are more likely to be equity based if they have a shared R&D component.

Unlike transaction costs analyses, the current work treated this hypothesis as a starting point rather than an end point.

**THE ROLE OF INTERFIRM TRUST IN ALLIANCES**

In recent years, numerous researchers have been critical of transaction cost economics’ treatment of each transaction between companies as an independent event (Doz & Prahalad, 1991; Ring & Van de Ven, 1992). This assumption is particularly inappropriate where firms repeatedly enter transactions with each other. Why and how are repeat alliances likely to differ from one-time alliances in governance structure? An important cause and consequence of such repeat alliances among firms is the emergence of interfirm trust, which obliges partners to behave loyally and can play an important role in their choice of governance structure for future alliances with each other. The term trust has widely varying connotations (for excellent reviews on the topic, see Barber [1983], Gambetta [1988], and Luhmann [1979]). In this context, I conceived of trust as “a type of expectation that alleviates the fear that one’s exchange partner will act opportunistically” (Bradach & Eccles, 1989: 104). This definition is akin to Simmel’s notion of mutual “faithfulness” in social relationships (Simmel, 1978: 379). Gambetta gave this cogent definition of such forms of trust:
Trust ... is a particular level of the subjective probability with which an agent assesses that another agent or group of agents will perform a particular action both before he can monitor such action ... and in a context in which it affects his own action. When we say we trust someone or that someone is trustworthy, we implicitly mean that the probability that he will perform an action that it beneficial or at least not detrimental to us is high enough for us to consider engaging in some form of cooperation with him (1988: 217).

Can there be trust between two organizations that are simply agglomerations of individuals. Intuitively, trust is an interpersonal phenomenon. Some sociologists have argued that although expectations of trust do ultimately reside within individuals, it is possible to think of interfirm trust in economic transactions (Zucker, 1986). At the organizational level, observers point to numerous examples of “preferential, stable, obligated, bilateral trading relationships” to illustrate that firms develop close bonds with other firms through recurrent interactions (Sabel, 1991). Recent historical accounts of industrial districts such as the modern woolens center at Prato, Italy, the injection molding center in Oyannax, France, the cutlery industry in Sheffield, England, and the nineteenth-century Swiss watch-making region (Piore & Sabel, 1984; Sabel, 1991; Sabel & Zeitlin, 1985; Weiss, 1984, 1988) support this argument. Similar accounts have been made of subcontracting relations in the Japanese textile industry (Dore, 1983), the French engineering industry (Lorenz, 1988), the American construction industry (Eccles, 1981), and the Italian textile industry (Johnston & Lawrence, 1988). A variety of terms have been used to describe this phenomenon: Williamson (1985) described it as both “relational contracting” and “obligational contracting”; Eccles (1981) as “quasi-firm arrangements”; Johnston and Lawrence (1988) as “value-added partnerships”; Dore (1983) as “obligated relational contracting”; and Zucker (1986) as “process-based trust.” Underlying all these accounts is a single notion: interfirm trust is incrementally built as firms repeatedly interact (Good, 1988).

The idea of trust emerging from prior contact is based on the premise that through ongoing interaction, firms learn about each other and develop trust around norms of equity, or “knowledge-based trust” (Shapiro, Sheppard, & Cheraskin, 1992). There are strong cognitive and emotional bases for such trust, which are perhaps most visible among individual organization members (Lewis & Weigert, 1985). Macaulay, in a seminal essay, observed how close personal ties emerged between individuals in organizations that contracted with each other; these personal relationships in turn “exert pressures for conformity to expectations” (Macaulay, 1963: 63). Palay (1985) similarly found that the relationships between rail-freight carriers and auto shippers were overlaid with close personal connections among members of those organizations. He described how these overlapping relationships were an important factor in their use of informal contracts in a situation that would otherwise have demanded a detailed, formal contract because of high trans-
action costs. Kanter and Myers (1989) pointed out that interpersonal ties across organizations with alliances increase over time. Similarly, Ring and Van de Ven (1989) pointed to the important role of informal, personal connections across organizations in determining the governance structures used to organize their transactions.

How is trust between firms likely to alter their choice of contracts in subsequent alliances? Perhaps the biggest concern of firms entering alliances is the predictability of their partners' behavior. A detailed contract is one mechanism for making behavior predictable, and another is trust. Where there is trust, people may not choose to rely upon detailed contracts to ensure predictability. Indeed, as Macaulay observed: “Detailed negotiated contracts can get in the way of creating good exchange relationships between business units” (1963: 64).

Entertaining the possibility of trust between alliance partners emerging from prior ties clearly alters assessments of the transaction costs associated with specific alliances. Trust counteracts fear of opportunistic behavior and as a result, is likely to limit the transaction costs associated with an exchange. This process in turn should affect the governance structure of the alliance. In other words, trust can substitute for hierarchical contracts in many exchanges and serve as an alternative control mechanism (Bradach & Eccles, 1989).

It is important to distinguish knowledge-based trust just discussed from deterrence-based trust, which also plays a role in repeat alliances (Ring & Van de Ven, 1989; Shapiro et al., 1992). The latter emphasizes utilitarian considerations that may also lead to believing that a partner will behave in a trustworthy manner. Specifically, trust can arise when untrustworthy behavior by a partner can lead to costly sanctions that exceed any potential benefits that opportunistic behavior may provide. Some potential sanctions are loss of repeat business with the same partner, loss of other points of interaction between the two firms, and loss of reputation (Granovetter, 1985; Macaulay, 1963; Maitland, Bryson, & Van de Ven, 1985: 63). Thus, on strictly utilitarian grounds it is to the firm’s benefit to behave in a trustworthy manner.3

How significant might the role of such deterrent sanctions be in the case of interfirm alliances? Recent research on alliances suggests that most firms are embedded in a social network of prior alliances through which they are connected with one another either directly or indirectly (Kogut, Shan, & Walker, 1993; Powell & Brantley, 1993). Within such a dense social network, reputational considerations should play an important role in each firm’s potential for future alliances. Furthermore, as this article shows, many firms

3 In recent years there has been some debate on whether behavior with utilitarian motivations can really be described as trust (Uzzi, 1993; Williamson, 1993). For my purposes, interfirm trust encompasses such utilitarian behavior, and I choose not to engage in this debate.
do engage in repeat alliances with each other, suggesting that there are always prospects for future partnerships among presently allied firms.

Trust itself can be difficult to observe and measure. It has a taken-for-granted character since it is so closely linked to fundamental social norms and customs. Following prior research, I chose to use a factor that likely produces trust as its proxy (Zucker, 1986)—prior alliances between firms. This substitution is based on the intuition that two firms with prior alliances are likely to trust each other more than other firms with whom they have had no alliances (Ring & Van de Ven, 1989). Other theorists have made similar claims about the role of repeat alliances. In a survey-based empirical study, Parkhe (1993) observed that the presence of a prior history of cooperation between two firms limited their perception of expected opportunistic behavior in new alliances and as a result lowered the level of contractual safeguards employed in those alliances. Drawing on an inductive field study at seven pairs of firms in alliances, Larson (1992) observed that firms not only rely extensively upon mechanisms of social control, as opposed to formal contracts, in the formation and maintenance of alliances, but that such relational factors become increasingly important as the relationships between firms develop over time.

The operational proposition examined here is that firms are less likely to use equity in repeated alliances than in a first-time alliance since interfirm trust based on prior alliances reduces the imperative to use equity. Actors are thus willing to take what Williamson (1993) calls “calculative risks” because of their confident expectation that their counterparts will act responsibly. Thus:

Hypothesis 2: The greater the number of previous alliances between the partners in an alliance, the less likely the alliance is to be equity based.

A further question remains as to whether the character of the previous alliances affects the type of new alliance used. It could be that two firms will prefer a nonequity alliance only when they already have an equity alliance in place. According to such a logic, an equity alliance creates a hostage situation by requiring ex ante commitments by the partners and engendering partners’ concern for the value of their investments. Once two firms share one hostage it obviates the need for additional hostages. This is similar to what Williamson (1983) described as “credible commitments.” A singular focus on this hostage-taking character is, however, overly narrow. As high-

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4 Firms can be connected with other firms through a wide array of social and economic relationships. These include supplier relationships, trade association memberships, interlocking directorates, relationships amongst individual employees, and alliances. All these can be important sources of information that leads to trust. Indeed, prior research has shown that a variety of interorganizational contacts serve as conduits for both technological and social information about organizational activities (Baker, 1990; Davis, 1991). Because of limitations in the scope of this study, I focused on a single source of social connections among firms, prior alliances.
lighted earlier, prior equity alliances are more than simple hostages. They entail close interactions between the partners over prolonged periods of time, all of which can enhance trust through mutual awareness. As a senior manager whom I interviewed at a computer software firm said,

Our technology partnerships are organized as detailed equity-based contracts. . . . These in turn have led to numerous repeated alliances with the same set of firms. . . . In our subsequent alliances we don’t bother to write detailed contracts. That would not only be tedious but also an insult to our relationship. Sometimes we give our lawyers only a few days to write up the contract, and that too after the project may already have begun.

Such behavior could be a result of having a hostage in the form of an equity alliance already in place. However, informants also reported that the logic behind their use of loose contracts was not so much the existing equity alliance, but their familiarity with their partners and judgment that they were trustworthy (Gulati, 1993).

An alternative to the above scenario is that two firms will prefer a nonequity alliance even when they only have a prior nonequity tie that may be easy to dissolve but also enhances mutual awareness. This effect is likely to be less significant than that arising from the presence of prior equity alliances, which not only create shared hostages but may lead to closer interaction among partners. Thus,

Hypothesis 3a: The greater the number of previous equity alliances between the partners in an alliance, the less likely an alliance is to be equity based.

Hypothesis 3b: The greater the number of previous nonequity alliances between the partners in an alliance, the less likely the alliance is to be equity based.

Looking beyond the history of alliances between given firms, I also expected firms to trust domestic partners more than international partners, not only because more and better information is available about domestic firms, but also because the reputational consequences of opportunistic behavior are greater in a domestic context (Gerlach, 1990). “Character-based trust,” whereby firms trust others that are socially similar to themselves, may also be an issue (Zucker, 1986). Given such trust, I expected firms to be more willing to engage in loose, quasi-market alliances with domestic partners than with international partners.

Hypothesis 4: Alliances are more likely to be equity based if they are among firms of different nations.

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5 Of course, nonequity alliances, even if they can be easily dissolved, can be very important strategically and thus can still serve as important hostages.
Alliances can be between two or more partners. Research on group behavior suggests that beyond a certain threshold, an increase in the number of participants in any group can lead to dysfunctional behavior within the group and to a decline in its ability to perform assigned tasks (Hackman, 1987; Steiner, 1972). Within alliances, the presence of more than two partners heightens the possibility of stalemates and conflicts. Inasmuch as multilateral alliances pose larger organizational problems than bilateral alliances, I expected them to more likely be equity based.

Hypothesis 5: Alliances are more likely to be equity based if they are among more than two firms.

METHODS

Sample

The unit of analysis here was the transaction. My data set included information on all publicly announced alliances in the period 1970–89 in the biopharmaceuticals, new materials, and automotive economic sectors. The biopharmaceutical sector includes applications in therapeutics, vaccines, and diagnostics. The new materials sector includes metals, ceramics, polymers, and composites. The automotive sector includes both manufacturers of finished automobiles and their suppliers.

More than half the data came from the Cooperative Agreements and Technology Indicators (CATI) database, collected by researchers at the Maastricht Economic Research Institute on Innovation and Technology (MERIT) at the University of Limburg. Unlike data on alliances drawn solely from announcements in popular business periodicals like the Wall Street Journal, the CATI data were collected by examining technical journals, books, and business periodicals for various sectors. I collected the remainder of the alliance data used here from numerous sources, including industry reports, industry-specific articles reporting alliances, and materials from industry consultants. For the automotive industry, the sources I consulted included Automotive News, Ward’s Automotive Reports, U.S. Auto Industry Report, Motor Industry of Japan, and the Japanese Auto Manufacturers Forum; for the biopharmaceutical sector, Bioscan, Ernst & Young Reports, and the Biotechnology Directory; for the new materials sector, Office of Technology Assessment reports and Organization for Economic Cooperation and Development reports; and for all sectors, Predicast’s F & S Index of Corporate Change.

The goal of the data collection was to comprehensively cover all alliances formed within the selected industries. I placed no restrictions on the sizes of the partners in the alliances, including both large and small firms. Only alliances that had actually been formed were recorded. The complete data set includes information on over 2,400 alliances formed by American, European, and Japanese firms. To my knowledge, it is the most comprehen-
sive data set on alliances within each of the focal sectors, both in terms of the length of time included and the depth of coverage.6

The data segment acquired from MERIT coded information on the form of an alliance (equity based or not) and the activities it encompassed. This was based upon precise criteria used to draw assessments from the public announcement of the alliance. In coding the remainder of the data that I collected, I was consistent with the coding scheme outlined by MERIT. Furthermore, I assessed the reliability of the coding criteria by asking two academic experts on strategic alliances to code a random sample of 25 alliances using the information I had collected. There was complete coincidence in their coding and my own.

An alliance was labeled as including R&D only if a public announcement clearly stated that the agreement encompassed joint product development or basic R&D. Similarly, an alliance was coded as equity based when a public announcement said that an equity joint venture had been created or that a firm had taken a substantive minority position in another with the intent of pursuing joint projects.

Fortunately, most public announcements of alliances report detailed information on their governance structures, activities, and goals. When activities or governance structure were ambiguous, I tried to identify additional public records that more clearly stated the goals of a partnership. For over 30 percent of the alliance records that I collected, I consulted multiple sources.

The period of this study, 1970–89, was a potential source of bias, but there were strong reasons for choosing it. First, the growth of alliances in these years was unprecedentedly high (Anderson, 1990; Hagedoorn & Schakenraad, 1990), but little previous research on alliances has encompassed longitudinal data covering such an extensive time period. Inasmuch as the growth of alliances in this period represents current trends in alliances, the present findings should continue to be relevant to the contemporary formation of alliances.

A second possible limitation of the sampling design was that the data encompass only three industries. I exercised caution in interpreting results obtained with the pooled sample of data from all three industries, including dummy variables for each sector. Furthermore, I reestimated the models for each sector separately to ensure that the postulated effects held within each industry. Although these industries represent a broad spectrum in terms of stage of maturity, a legitimate remaining concern is that the findings reported here may be idiosyncratic to the industries included.

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6 The number of alliances examined here far exceeds the numbers examined in previous studies: Nohria and Garcia-Pont (1991) reported 96 automotive sector alliances for the period 1980–89 versus the 493 reported here; and Pisano (1989) reported 195 biopharmaceuticals alliances, versus the 781 reported here.
Dependent Variable

The dependent variable, mode of alliance, was coded “1” if an alliance involved the use of equity and “0” if it did not. The fundamental characteristic that distinguishes equity alliances from nonequity alliances is that equity sharing creates shared ownership and is, beyond a minimum threshold, effective in reducing exposure to opportunistic behavior.

Independent Variables

Table 1 describes the variables included in the analysis and summarizes arguments made in this article in the predicted signs.

For consistency with prior empirical research, I defined high transaction costs as the presence of an R&D component in an alliance (1 = R&D present, 0 = no R&D). R&D alliances included those that encompassed basic R&D, product development, or elements of both. Non–R&D alliances typically were those that involved joint production or marketing.

Hypothesis 2 concerns the relationship between the type of alliance

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<tr>
<th>Variable</th>
<th>Definition</th>
<th>Prediction</th>
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<tr>
<td>Mode</td>
<td>Dummy variable indicating if alliance was equity based</td>
<td>Dependent variable</td>
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<tr>
<td>R&amp;D component</td>
<td>Dummy variable indicating presence of an R&amp;D component in the alliance</td>
<td>+</td>
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<tr>
<td>Repeated ties</td>
<td>Number of prior alliances between the firms</td>
<td>–</td>
</tr>
<tr>
<td>International alliance</td>
<td>Set to one if the firms are of differing nationalities (default domestic)</td>
<td>+</td>
</tr>
<tr>
<td>Multilateral alliance</td>
<td>Set to one if the alliance has more than two partners (default bilateral)</td>
<td>+</td>
</tr>
<tr>
<td>Repeated equity ties</td>
<td>Number of prior equity alliances between the firms (in the presence or absence of any nonequity alliances)</td>
<td>–</td>
</tr>
<tr>
<td>Repeated nonequity ties</td>
<td>Number of prior nonequity alliances between the firms (in the absence of any equity alliances)</td>
<td>–</td>
</tr>
<tr>
<td>New materials sector</td>
<td>Set to one if firms are in the new materials sector (default biopharmaceutical)</td>
<td>No prediction</td>
</tr>
<tr>
<td>Automotive sector</td>
<td>Set to one if firms are in the automotive sector (default biopharmaceutical)</td>
<td>No prediction</td>
</tr>
<tr>
<td>Year</td>
<td>A year value for each record ranging from 1 to 19</td>
<td>No prediction</td>
</tr>
<tr>
<td>Percentage of equity alliances</td>
<td>Percentage of equity alliances announced in the industry in the prior year</td>
<td>+</td>
</tr>
</tbody>
</table>
between given partners and the history of alliances between them. The variable repeated ties recorded the number of prior alliances two firms had had since 1970 (0 = first-time alliance). I also calculated the variables repeated equity ties and repeated nonequity ties, respectively indicating the number of prior equity and nonequity alliances between two parties. These variables also took a zero value for a first-time alliance of the given type.

An important clarification is necessary at this point. Three alternative scenarios are possible in the history of alliances between two firms. The two could have entered (1) only nonequity alliances in the past, or (2) only equity alliances, or (3) both equity and nonequity alliances. To which category should the third scenario be assigned? Since Hypothesis 3a predicts the role of prior equity ties, in the presence or absence of other nonequity ties, repeated equity includes both the situation in which there are only prior equity alliances and that in which there have been mixed alliances. Hypotheses 3b, on the other hand, focuses on the effect of prior nonequity alliances in the absence of any other ties. Hence, repeated nonequity ties does not include situations with mixed alliances.

I included a dummy variable indicating whether an alliance was domestic or international (1 = partners of differing nationalities, 0 = partners of the same nationality).

To capture any effects that arose from the number of partners in an alliance, I computed that number. Since the alliances in the sample were either bilateral or trilateral, this variable was recoded as a dummy variable with a value of “1” if an alliance was multilateral and a value of “0” if an alliance was bilateral.

**Statistical Model**

A “logit” model was used to assess the effects of the independent variables on the likelihood of an alliance being equity based (Aldrich & Nelson, 1984). The general specification of the model used was as follows: 

\[ \log \left( \frac{P(M_i = 1)}{1 - P(M_i = 1)} \right) = A_0 + B_1(X_i), \]

where \( P(M_i = 1) \) is the probability that alliance \( i \) is equity based and \( X_i \) is the vector of independent variables. A variable’s positive coefficient indicates its propensity to promote equity alliances.

**Controls**

I included two control variables to represent the three sectors studied. One dummy variable was coded “1” if an alliance was in the new materials sector, “0” otherwise, and the second was coded “1” if the alliance was in the automotive sector and “0” otherwise. The default sector was biopharmaceuticals.

A control variable assessing the relationship of equity alliance formation to the percentage of equity alliances announced in an industry was also included. I counted the number of alliances announced in an industry in the year prior and computed the percentage of those that were equity based. In a limited way, this variable tested the institutionalist claim that firms mimic
TABLE 2
Descriptive Statistics and Correlations

<table>
<thead>
<tr>
<th>Variables</th>
<th>Frequency</th>
<th>Frequency</th>
<th>Means</th>
<th>s.d.</th>
<th>Minimum</th>
<th>Maximum</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Mode</td>
<td>840</td>
<td>1,577</td>
<td>0.65</td>
<td>0.47</td>
<td>0</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. R&amp;D component</td>
<td>1,015</td>
<td>1,402</td>
<td>0.58</td>
<td>0.49</td>
<td>0</td>
<td>1</td>
<td>.17</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Repeated ties</td>
<td>1.40</td>
<td>0.98</td>
<td></td>
<td></td>
<td>9</td>
<td>-.08</td>
<td>.04</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. International alliance</td>
<td>1,322</td>
<td>1,095</td>
<td>0.45</td>
<td>0.49</td>
<td>0</td>
<td>1</td>
<td>.02</td>
<td>-.19</td>
<td>.01</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Multilateral alliance</td>
<td>1,756</td>
<td>661</td>
<td>0.27</td>
<td>0.45</td>
<td>0</td>
<td>1</td>
<td>.05</td>
<td>.07</td>
<td>.06</td>
<td>-.22</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Repeated equity ties</td>
<td>1.18</td>
<td>0.85</td>
<td></td>
<td></td>
<td>9</td>
<td>-.15</td>
<td>.02</td>
<td>.75</td>
<td>-.01</td>
<td>.05</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Repeated nonequity ties</td>
<td>0.01</td>
<td>0.11</td>
<td></td>
<td></td>
<td>2</td>
<td>.01</td>
<td>.02</td>
<td>.12</td>
<td>.02</td>
<td>.00</td>
<td>-.05</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. New materials sector</td>
<td>1,274</td>
<td>1,143</td>
<td>0.47</td>
<td>0.49</td>
<td>0</td>
<td>1</td>
<td>.05</td>
<td>-.04</td>
<td>-.13</td>
<td>-.09</td>
<td>.28</td>
<td>-.13</td>
<td>-.04</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Automotive sector</td>
<td>1,924</td>
<td>493</td>
<td>0.20</td>
<td>0.40</td>
<td>0</td>
<td>1</td>
<td>.06</td>
<td>-.15</td>
<td>.09</td>
<td>.06</td>
<td>.01</td>
<td>.07</td>
<td>.00</td>
<td>.48</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Year</td>
<td>14.50</td>
<td>3.62</td>
<td>1</td>
<td>19</td>
<td>19</td>
<td>-.08</td>
<td>.00</td>
<td>.08</td>
<td>.02</td>
<td>.06</td>
<td>.05</td>
<td>.03</td>
<td>.07</td>
<td>-.16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Percentage of equity</td>
<td>0.35</td>
<td>0.15</td>
<td>0.13</td>
<td>1.00</td>
<td></td>
<td>.10</td>
<td>-.06</td>
<td>-.02</td>
<td>.00</td>
<td>.03</td>
<td>-.01</td>
<td>-.01</td>
<td>.14</td>
<td>.15</td>
<td>-.35</td>
<td></td>
</tr>
</tbody>
</table>

a Where no figure is given, value is a count. Totals = 2,417 except for the percentage of equity alliances, for which it is 2,395.
the contracts other firms in their industry use. This variable can also be interpreted as capturing the net effect of the various macroeconomic factors within an industry that may influence the formation of equity alliances (Amburgey & Miner, 1992).

Finally, I included a dummy variable for each year to capture temporal effects and also control for any temporal autocorrelation.

RESULTS

Table 2 presents descriptive statistics and correlations for all variables. The data presented in this table point to the diversity of alliances included in the pooled sample, in which over 500 of the approximately 2,400 alliances were repeat links between firms.

The correlations show a few problems of multicollinearity. Notably, repeated equity ties is highly correlated with repeated ties ($r > .70$); the high correlation is no surprise since repeated equity ties is a nested subset of repeated ties. Because of the collinearity, I introduced these variables separately in the logit analysis.

Table 3 presents the logistic regression estimates. The first column reports the base model including all the control variables. The coefficients for the sector variables were significant ($p < .01$) in all cases. Although this finding suggests intrinsic industry differences in the likelihood that equity-based alliances will be used (the constant terms for each of the industries differ), it does not reveal whether or not the main effects hypothesized differ across the three industries. More specifically, the positive signs indicate that both the automotive and new materials sectors were more likely to have equity-based alliances than the biopharmaceutical sector, once independent variables included in each model were controlled. I later estimated unrestricted models for each of the industries (these results are not presented here). The signs of the coefficients indicated that the postulated directions of the main effects were indeed observed in each sector.

My original estimations included a dummy variable for each year. For simplicity of presentation, I reestimated the models using a single variable, year, which ranges in value from 1 to 19, indicating each year. No differences in results for the other independent variables were observed in these two sets of estimates, and the results are mixed for year, which is significant in some models and not in others.

The positive and significant coefficient ($p < .01$) for the percentage of equity-based alliances announced in an industry in a given year suggests that this variable positively affects the use of equity alliances by firms in the industry in the subsequent year. This finding holds true in the remaining models as well and suggests that the form of contracts used in alliances may be linked to an industry’s propensity to use equity alliances.

The second column in Table 3 shows results with the measure of transaction costs introduced into the model. The results are consistent with Hypothesis 1: alliances involving R&D are more likely to be equity based than are non–R&D alliances, a relationship indicated by the positive coefficients.
TABLE 3
Results of Logistic Regression Analysis

<table>
<thead>
<tr>
<th>Variables</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
<th>Model 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-0.83**</td>
<td>-1.55**</td>
<td>-1.53**</td>
<td>-1.66**</td>
<td>-1.66**</td>
</tr>
<tr>
<td></td>
<td>(0.26)</td>
<td>(0.27)</td>
<td>(0.28)</td>
<td>(0.28)</td>
<td>(0.28)</td>
</tr>
<tr>
<td>R&amp;D component</td>
<td>0.90**</td>
<td>0.99**</td>
<td>0.99**</td>
<td>0.99**</td>
<td>0.99**</td>
</tr>
<tr>
<td></td>
<td>(0.09)</td>
<td>(0.09)</td>
<td>(0.09)</td>
<td>(0.09)</td>
<td>(0.09)</td>
</tr>
<tr>
<td>Repeated ties</td>
<td>-0.23**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.05)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>International alliance</td>
<td>0.33**</td>
<td>0.32**</td>
<td>0.32**</td>
<td>0.32**</td>
<td>0.32**</td>
</tr>
<tr>
<td></td>
<td>(0.09)</td>
<td>(0.09)</td>
<td>(0.09)</td>
<td>(0.09)</td>
<td>(0.09)</td>
</tr>
<tr>
<td>Multilateral alliance</td>
<td>0.12</td>
<td>0.15</td>
<td>0.15</td>
<td>0.15</td>
<td>0.15</td>
</tr>
<tr>
<td></td>
<td>(0.11)</td>
<td>(0.11)</td>
<td>(0.11)</td>
<td>(0.11)</td>
<td>(0.11)</td>
</tr>
<tr>
<td>Repeated equity ties</td>
<td>-0.97**</td>
<td>-0.97**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.13)</td>
<td>(0.13)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Repeated nonequity ties</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.11</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(0.37)</td>
</tr>
<tr>
<td>New materials sector</td>
<td>0.36**</td>
<td>0.50**</td>
<td>0.47**</td>
<td>0.41**</td>
<td>0.41**</td>
</tr>
<tr>
<td></td>
<td>(0.10)</td>
<td>(0.11)</td>
<td>(0.12)</td>
<td>(0.12)</td>
<td>(0.12)</td>
</tr>
<tr>
<td>Automotive sector</td>
<td>0.42**</td>
<td>0.67**</td>
<td>0.69**</td>
<td>0.68**</td>
<td>0.68**</td>
</tr>
<tr>
<td></td>
<td>(0.13)</td>
<td>(0.13)</td>
<td>(0.14)</td>
<td>(0.14)</td>
<td>(0.14)</td>
</tr>
<tr>
<td>Year</td>
<td>-0.03*</td>
<td>-0.03*</td>
<td>-0.02</td>
<td>-0.02</td>
<td>-0.02</td>
</tr>
<tr>
<td></td>
<td>(0.01)</td>
<td>(0.01)</td>
<td>(0.01)</td>
<td>(0.01)</td>
<td>(0.01)</td>
</tr>
<tr>
<td>Percentage of equity</td>
<td>0.90**</td>
<td>0.99**</td>
<td>1.03**</td>
<td>1.08**</td>
<td>1.08**</td>
</tr>
<tr>
<td>alliances</td>
<td>(0.30)</td>
<td>(0.31)</td>
<td>(0.31)</td>
<td>(0.32)</td>
<td>(0.32)</td>
</tr>
<tr>
<td>N</td>
<td>2,395</td>
<td>2,395</td>
<td>2,395</td>
<td>2,395</td>
<td>2,395</td>
</tr>
<tr>
<td>-2 log likelihood</td>
<td>3,041.74</td>
<td>2,946.79</td>
<td>2,915.02</td>
<td>2,875.03</td>
<td>2,874.93</td>
</tr>
<tr>
<td>( \chi^2 )</td>
<td>45.37**</td>
<td>140.31**</td>
<td>172.09**</td>
<td>212.08**</td>
<td>212.18**</td>
</tr>
<tr>
<td>df</td>
<td>4</td>
<td>5</td>
<td>8</td>
<td>8</td>
<td>9</td>
</tr>
</tbody>
</table>

\(^a\) Standard errors are in parentheses.

* \( p < .05 \)

** \( p < .01 \)

of the variable R&D component \((p < .01)\). This finding remains true in later models as well.

The third column shows results with the three measures of trust: the number of prior alliances by the same pair of firms, whether they were domestic or international, and the number of partners involved. Results suggest that the repetition of ties is a significant determinant of mode of alliance \((p < .01)\). Specifically, the negative coefficient of the dummy variable repeated ties supports Hypothesis 2 and indicates that the larger the number of prior alliances between partners, the less likely their current alliance is to be equity based, even when the presence of an R&D component is controlled for. The positive and significant coefficient for international alliance supports Hypothesis 4, which predicts that such alliances are more
likely to be equity based than domestic alliances. No support is found for Hypothesis 5, however, which predicts that the use of equity is more likely in multilateral than in bilateral alliances. These results remain true in subsequent models.

Models 4 and 5 were estimated using the measures of prior equity and nonequity alliances. The variable for repeated alliances was omitted because of multicollinearity concerns. In both models, results suggest that the number of prior equity-based ties between two firms reduces the likelihood that a current alliance between them will be equity based, thus supporting Hypothesis 3a.

Results do not support Hypothesis 3b, which postulates that even in the absence of prior equity ties, the larger the number of nonequity alliances between two firms, the less likely their future alliance is to be equity based. However, the number of alliances that actually fit this pattern was extremely small (N = 23). Thus, the insignificant finding may be the result of my having too few observations.

Looking at the overall fit of each of the models indicated by their $-2 \log$ likelihoods and associated chi-squares, I observed that the introduction of R&D in model 2 significantly improved the fit of the base model. Another significant improvement occurred in models 3 and 4, with the introduction of the variables for repeated, international, and multilateral alliances and that for repeated equity ties.

Table 4 presents the classification tables corresponding to each of the models in Table 3. These tables succinctly highlight the association between the predicted and observed responses for each model. All five models perform better than a random proportional chance model, which would have a “hit rate” of $p^2 + (1 - p)^2$, where $p$ is the probability of an event’s having occurred (Bayus & Gupta, 1992). On the basis of the observed proportion of events, I estimated $p$ to be .65 (1,568/2,395). Thus, the classification accuracy for a random model is 54.25 percent. The percentage of correctly classified cases in the five models reported ranges from 65.7 to 67.7 percent, a rate clearly superior to the random model. The models also perform better than a simple model with only the intercept (which would predict all nonevents), albeit not by a large percentage difference. Although this pattern suggests a significant improvement over a random proportional chance model, it also indicates that I may have overlooked additional relevant variables.

The relative magnitudes of raw logit coefficients are not directly interpretable since they refer to the increase in logarithmic odds resulting from a unit increase in a variable. In Table 5 I present elasticities for the key variables entered in two models shown in Table 3 (Ben-Akiva & Lerman, 1985; Fernandez & McAdam, 1988; Peterson, 1985). Elasticities indicate the per-

---

7 I computed these elasticity scores by looking across all individual records as opposed to simply setting mean values for each independent variable and then looking at percentage shifts.
TABLE 4
Estimates of Fit of Logistic Regression Models

<table>
<thead>
<tr>
<th>Observed</th>
<th>Predicted</th>
<th>Percentage Correct</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No Event</td>
<td>Event</td>
</tr>
<tr>
<td>Model 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No event</td>
<td>20</td>
<td>807</td>
</tr>
<tr>
<td>Event</td>
<td>15</td>
<td>1,553</td>
</tr>
<tr>
<td>Total</td>
<td>35</td>
<td>2,360</td>
</tr>
<tr>
<td>Model 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No event</td>
<td>125</td>
<td>702</td>
</tr>
<tr>
<td>Event</td>
<td>91</td>
<td>1,477</td>
</tr>
<tr>
<td>Total</td>
<td>216</td>
<td>2,179</td>
</tr>
<tr>
<td>Model 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No event</td>
<td>173</td>
<td>654</td>
</tr>
<tr>
<td>Event</td>
<td>119</td>
<td>1,449</td>
</tr>
<tr>
<td>Total</td>
<td>292</td>
<td>2,103</td>
</tr>
<tr>
<td>Model 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No event</td>
<td>199</td>
<td>628</td>
</tr>
<tr>
<td>Event</td>
<td>177</td>
<td>1,391</td>
</tr>
<tr>
<td>Total</td>
<td>376</td>
<td>2,019</td>
</tr>
<tr>
<td>Model 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No event</td>
<td>199</td>
<td>628</td>
</tr>
<tr>
<td>Event</td>
<td>178</td>
<td>1,390</td>
</tr>
<tr>
<td>Total</td>
<td>377</td>
<td>2,018</td>
</tr>
</tbody>
</table>

The results in Table 5 must be interpreted with caution since each variable has a different underlying measurement scale. In particular, for R&D, a unit change indicates that non–R&D alliances possibly had an R&D component. For repeated alliances, a unit change indicates the existence of one more prior alliance. Thus, Table 5 shows that if two firms had entered an R&D alliance instead of a non–R&D alliance, their likelihood of forming an equity joint venture would have increased by about 38 percent. If two

TABLE 5
Elasticities* for Logistic Regression Analysis Results

<table>
<thead>
<tr>
<th>Variables</th>
<th>Model 3</th>
<th>Model 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>R&amp;D</td>
<td>37.73</td>
<td>38.36</td>
</tr>
<tr>
<td>Repeated ties</td>
<td>-14.13</td>
<td></td>
</tr>
<tr>
<td>International alliance</td>
<td>12.47</td>
<td>12.10</td>
</tr>
<tr>
<td>Multilateral alliance</td>
<td>5.74</td>
<td>7.46</td>
</tr>
<tr>
<td>Repeated equity ties</td>
<td>-13.70</td>
<td></td>
</tr>
<tr>
<td>Repeated nonequity ties</td>
<td>7.51</td>
<td></td>
</tr>
</tbody>
</table>

* Elasticity is the change in probability resulting from a unit change in an independent variable.
firms entering an alliance had one more prior alliance of any kind, model 3 suggests that their likelihood of forming an equity joint venture would have declined by 14.13 percent. Model 5 suggests that one more prior equity alliance reduced the likelihood of forming an equity alliance by 13.70 percent. Similarly, the marginal effects of international and multilateral alliances are also reported.

**DISCUSSION**

The results of models 1 through 5 (Table 3) provide strong evidence for most of the present hypotheses. They show (1) that R&D–based alliances are more likely to be equity based than non–R&D alliances, (2) that the larger the number of prior alliances between two firms, the less likely are their subsequent alliances to be equity based, (3) that the larger the number of prior equity alliances across two firms, the less likely their subsequent alliances are to be equity based, and (4) that international alliances are more likely to be equity based than domestic alliances. No support, however, emerged for the claim that prior nonequity alliances alone reduce use of equity in new alliances. Also, the number of partners in an alliance does not seem to affect the form of governance used.

Taken together, the results suggest that firms select contractual forms for their alliances on the basis of not only the activities they include (R&D), but also the existence and frequency of prior ties with a partner. What emerges from this account is an image of alliance formation in which cautious contracting gives way to looser practices as partner firms build confidence in each other. In other words, familiarity between organizations through prior alliances does indeed breed trust.

In an important review of the transaction cost economics literature, Bradach and Eccles (1989) argued that three primary control mechanisms govern economic transactions between firms: price, authority, and trust. They observed that, in equity alliances, firms rely upon a mix of price and authority—price because of concern for the value of their equity, and authority because of the hierarchy created. Such an approach, however, looks at alliances in a static context, treating each transaction as independent, without taking into account how the relationships can evolve over time. Observing interfirm alliances over time suggests that repeated ties between firms engender trust that is manifested in the form of the contracts used to organize subsequent alliances. Firms appear to some degree to substitute trust for contractual safeguards in their repeated alliances. Thus, trust is also an important component of the control mechanisms used within alliances.

The creation of trust is most visible between partners that already have an equity alliance in place. My earlier discussion of some of the processes underlying interorganizational behavior suggests that prior equity ties are not simply mutual hostages that enhance each firm’s ability to penalize partners that behave opportunistically, but also conduits for the exchange of information between partners that allow them to build knowledge-based
trust in each other. The finding here that only having prior equity alliances led to looser contracts could very well indicate that equity alliances foster closer interaction between partners than do nonequity alliances.

The results reported here do not show that prior nonequity alliances alter the choice of subsequent contracts. Such alliances may represent purely knowledge-based trust but, as pointed out earlier, this argument is somewhat tenuous. It is difficult to draw any significant conclusions from this finding because of the extremely small number of observations of such cases.8

Although the findings reported here enhance understanding of governance structure in alliances, they have broad implications for transaction cost economics as well. Building on the original insights of Coase (1937), this theory has reified the transaction as the unit of analysis, treating each transaction as an independent event. It has ignored the work of Commons (1970), Coase's contemporary, who also placed importance on transactions as the appropriate unit of analysis but offered a more process-oriented and temporally informed view of transactions (cf. Van de Ven, 1993). Other researchers have offered similar exhortations (cf. Zajac & Olsen, 1993), but organizational researchers have yet to take them up. The current work, a step in this direction, suggests that transaction cost economics must explicitly incorporate the role of prior ties in its analytical framework. In particular, if the theory's emphasis on the transaction as the appropriate unit of analysis is to remain viable, the interdependencies that result from prior transactions should be included.

Within the broad market-versus-hierarchy argument, my focus has been on those cases in which firms have decided to form an alliance and face the issue of the type of governance to be used. Within this narrow domain, not only the complexity of activities within the alliance moderates firm behavior—the social context resulting from past alliances also affects the contractual form an alliance takes. Similarly, transaction costs as traditionally defined are unlikely to singularly determine decisions about the use of markets, alliances, or hierarchical integration, and social context should play an important role (Granovetter, 1985).

The findings of this study have several practical consequences for interfirm alliance activity and, more broadly, for interfirm cooperation. The study highlights a number of efficiency benefits that follow from creating trust in cooperative relationships. First, drafting detailed contracts can be costly and time consuming. Business Week (1986) reported that executives can spend as much as 23 percent of their time developing alliance plans and 19 percent of their time drafting legal documents. Trust between partners

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8 In a competing perspective regarding prior nonequity alliances, commitment between organizations would be viewed as incrementally escalating. In this view, firms may first “test the water” with each other through loosely organized small-scale projects and subsequently expand the scopes of their partnerships by entering equity alliances with each other. In this case, the existence of a prior nonequity alliance would make it more likely that a subsequent alliance would be equity based.
can reduce such costs. As Arrow (1974) claimed, trust is perhaps the most efficient mechanism for governing economic transactions. Trust may also expand the realm of feasible alliances and allow firms to enter partnerships that may otherwise have been deemed impossible, even with detailed equity contracts. Furthermore, detailed contracts can stifle a partnership's adaptability to shifting environments.

Another efficiency-related benefit for firms in trusting relationships is reduced search costs. An important concern for firms seeking new alliances is the availability of trustworthy partners, and considerable effort can be devoted to identifying them (Nohria, 1993). Firms placed in a social network of trusting relationships can significantly reduce their search for new partners when they decide to ally with an entity they already trust (Gulati, 1993).

Limitations and Future Research

An important dimension omitted in this discussion is how organizational factors guide contractual choices. Each partners' size, technological sophistication, resource constraints, and prior experience with alliances can play a role, as can a host of other factors. Osborn and Baughn (1990) pointed to the size of partners as an important determinant of the governance structure of alliances.

Another possible line of inquiry would be a finer-grained analysis of contractual forms of alliances. For equity alliances, this analysis could entail examining what explains the distribution of ownership, or more broadly, the distinctions between asymmetrically and symmetrically owned partnerships. For nonequity alliances, researchers could look in more detail at the various forms included within this category, arrayed on a scale running from informal to formal, and some of the factors that explain the specific form used.

Following prior empirical research by transaction cost theorists, I used the presence of R&D in an alliance as a proxy for transaction costs. There is considerable room for improvement in measuring these costs. Such improvement would not only allow a more accurate assessment of the multifaceted role of transaction costs in alliances, but would also test how appropriate R&D has been as a measure of transaction costs.

Yet another arena for future research could be examining the social context in which alliances take place in more depth. My focus has been on direct ties between firms established through prior alliances. It would be interesting to assess the role of a broader social context, encompassing other forms of interfirm connections besides alliances, defined by both direct and indirect ties.

Finally, an important area for future research would be to identify, measure, and empirically assess the role of trust in the formation, governance, and ultimate success of interfirm alliances. I relied on the history of prior ties as the factor most likely to produce trust, but a vast gap in understanding the many dimensions of trust and their operation within alliances remains.

The suggested analyses offer exciting research opportunities, but require
the collection of data beyond those available for this research. Examining organizational factors guiding contractual choices would require detailed data on the firms participating in the alliances studied. Similarly, a richer analysis of the contractual forms themselves would entail collecting detailed data on the contracts used and, in the case of equity alliances, the distribution of equity shares. Disentangling transaction costs in alliances and assessing their various components would require detailed information on the transactions themselves and the specific circumstances of each of the partners. An examination of the effects of the overall social structure would entail collecting information on various additional ties among organizations. Assessing interfirm trust and its various dimensions would most likely entail a detailed survey administered to managers in firms participating in alliances. Given the comprehensiveness with which this study covered alliance announcements and the resultant large number of alliances included (2,417), detailed data collection on firms and contracts was not possible. These further issues are, however, important, and they present some of the most exciting opportunities for future research on interfirm cooperation.

CONCLUSION

The most basic conclusion that follows from this study is that contracts chosen in alliances do not depend wholly upon the activities included within the partnership and their associated transaction costs. Rather, such choices also depend on the trust that emerges between organizations over time through repeated ties. My findings suggest that neither transaction costs nor social factors should dominate discussion of alliances and that in the final analysis, any explanation should encompass both.

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